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Juvenile Salmonid Stomach Data From the Vicinity of Campbell River, British Columbia From 1982 to 1986

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October 1989

Canadian Data Report of Fisheries and Aquatic Sciences No. 774

Fisheries and Oceans Pêches et Océans

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Canadian Data Report of Fisheries and Aquatic Sciences

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90-02596/

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Cat. No. Fs 97-13/774E ISSN 0706-6465

Correct citation for this publication:

Brown, T. J., J. S. Macdonald, and C. D. McAllister. 1989. Juvenile salmonid stomach data from the vicinity of Campbell River, British Columbia from 1982 to 1986. Can. Data Rep. Fish. Aquat. Sci. 774: 157 p.

ABSTRACT

Brown, T. J., J. S. Macdonald, and C. D. McAllister. 1989. Juvenile salmonid stomach data from the vicinity of Campbell River, British Columbia from 1982 to 1986. Can. Data Rep. Fish. Aquat. Sci. 774: 157 p.

Data on the stomach contents of juvenile salmonids sampled from 1982 to 1986 in the vicinity of Campbell River, British Columbia are reported. Identification to the species level was pursued where this could be achieved with reasonable effort and certainty. The data has been arranged chronologically and is presented in Appendix 1.

RÉSUMÉ

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Ce rapport présente les données sur les contenus gastriques des jeunes salmonidés prélevés de 1982 à 1986 à proximité de la rivière Campbell en Colombie-Britannique. Une identification jusqu'au niveau de l'espèce a été effectuée lorsqu'il a été possible de le faire avec un certian degré de certitude. Les données ont été organisées par ordre chronologique et son présentées dans l'annexe I.

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JUVENILE SALMONID STOMACH DATA FROM THE VICINITY OF CAMPBELL RIVER BRITISH COLUMBIA, FOR 1982 TO 1986

The Campbell River project was initiated in 1982 and continued for 5 years. British Columbia Forest Products (BCFP) built a dry land log sort and dredged a booming pocket on the south-west side of the estuary in 1981 (stn. 10, Fig. 1). To compensate for the lost marshes, four intertidal islands were built and planted with sedge grass from the dredged area.

Since 1982 several agencies have been involved in assessing the rehabilitated area. These included the Department of Fisheries and Oceans, BCFP, the Canadian Wildlife Service and the Ministry of the Environment as well as others (Brownlee et al. 1984). The study to evaluate the effects of the estuarine rehabilitation on the survival of the juvenile salmonids was initiated using beach seine in 1982 (Brown et al. 1983, 1984a, b, 1985, 1986).

This report represents a summary of all the juvenile salmonid stomach data collected as part of the habitat assessment from 1982 to 1986. Stomachs from 922 marked hatchery chinook and 1333 wild chinook and chum were examined. This report presents the stomach analysis as well as date, station, zone and size data for each fish.

MATERIALS AND METHODS

Eighty surveys were made near Campbell River from March 1982 to August 1986 (Brown et al. 1987) during which beach seining for juvenile salmonids occurred. The net used was 13.7m with 4.5m wings, 4.6m bunt (0.6cm stretched mesh) and 3m deep. Fifty eight stations were occupied during the 5 year study with duplicate sets made at each site except for the stations on islands 1 and 3 in which grooves were seined and replicates were not required. Some of the stations were sampled sporadically and the fish were excluded from stomach analysis. The remaining stations were renumbered from 1 to 31 (Table 1) starting furthest up the river and ending at the most distant marine station (Fig. 1, 2, Table 2).

The sampled fish were preserved in 10% formalin for length, weight and stomach analysis. Each fish examined was transferred to a water filled dish where the stomach was removed, blotted dry and weighed. The contents were then removed and the empty stomach blotted dry and reweighed to calculate the weight of the contents. The contents were placed under a Wild M5 (M7)

dissecting microscope and identified to the lowest possible taxonomic level (Table 3) consistent with contract requirements and available literature. The data presented here (Appendix 1) is complied from various contract reports (Anderson and Galbraith 1984, Woods 1985, Cross 1985) and inhouse analysis (Macdonald et al. 1985).

ACKNOWLEDGEMENTS

We would like to thank M. Kotyk for the inhouse stomach analysis and B. Raymonds' job development staff for assistance in coding the data.

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Table 1. New station numbers.

New Station Number	Zone	Original Station Numbers
1	Estuarine	47
2		10
3		7
4		8
5		6
6		1
7		2
8		3
9		111
10		37
11		11
12		14,141,15,151,16,17
13		18
14	Transition	4
15		5
16		35
17		34
18		22
19		20
20		21
21	Marine	292
22		27
23		28
24		23
25		25
26		241
27		24
28		30
29		31
30		322
31		32

Table 2. Station descriptions.

New station number and vernacular	Description, Habitat
1. (Fred's Slough)	Small beach on channel south of Baikie's Slough; overgrown with willows; wood debris, backing onto Raven Lumber sorting yard; shallow slope.
2. (SBM)	South shore of south arm of Baikie's Slough at confluence with Campbell River; sand; moderate drop-off.
3. (NBM)	South shore of north arm of Baikie's Slough at confluence with Campbell River; marsh at higher elevations, eelgrass at lower elevations; moderate drop-off.
4. (NBS)	North shore of north arm of Baikie's Slough at confluence with channel leading to Freshwater Marina; marsh at higher elevations, mud-wood debris at lower elevations; moderate drop-off.
5. (Bulkhead)	Gravel beach by wooden bulkhead, west side of Campbell River; moderate drop-off.
6. (M. Ramp)	Beside Coval Air seaplane ramp, west side of Tyee Spit; sand, marsh at high elevation; moderate slope.
7. (Nunns Is.)	Southeast tip of Nunns Island; sand/mud, marsh at high elevation; moderate slope.
8. (Nunns Creek)	North side of Nunns Creek mouth; marsh; very steep drop-off.
9. (Grass Is.)	Northwest side of Natural Island south of island no. 1; sand/mud marsh at higher elevation; steep drop for 1m then moderate slope.
10. (Log Sort)	Within bay of B.C. Forest Products log sorting area; log booms; rip-rap; steep slope.
11. (Is. No. 1)	Bay on island no. 1; transplanted marsh at higher elevations; mud/wood debris at lower elevations; shallow slope.
12. (Is. No. 3)	6 experimental tidal grooves on Island no. 3; mud/wood/algae at lower elevations; transplanted

Table 2 (cont'd)

		marsh at higher elevations; moderate slope.
13.	(Is. No. 4)	West side of Is. No. 4; gravel; mud/wood debris at lower elevations; shallow slope.
14.	(Spit)	Northwest tip of Tyee Spit; gravel; very steep drop-off.
15.	(Bar)	Sand/gravel bar on north side of river mouth channel; eelgrass at lower elevations; moderate drop-off. Exposed when tide levels <2m.
16.	(Outer Bar)	Beach approximately 100m north of station 15 sand/gravel bar, eelgrass at lower elevation; moderate slope with steep drop-off. Exposed on tides <2m.
17.	(Painter's Channel)	Eastern shore on a channel near Painter's Lodge exposed on tides <2m; mud/sand with eelgrass at lower elevation; shallow slope.
18.	(North Painter's)	Est. 500m north of Painter's Lodge; sand beach; boulders at lower elevation; moderate slope.
19.	(Boat Ramp)	Next to boat launch ramp on east side of Tyee Spit; gravel/cobble beach; moderate slope.
20.	(McDonald's)	Est. 200m north of ferry dock; Campbell River, gravel/cobble; moderate slope. Exposed on tide levels <2m; adjacent to rip-rap.
21.	(Unkak Cove)	Cove at north end of Quathiaski Cove; sand/mud; eelgrass patches; shallow slope.
22.	(Outer Gowlland)	Beach on southwest side of Gowlland Island; cobble/boulder; kelp beds; moderate slope.
23.	(Inner Gowlland)	Beach in small cove at south entrance to Gowlland Harbour; cobble, with some boulders; high sea cucumber/sea urchin populations; moderate to shallow slope with steep drop-off.
24.	(Middle Point)	Est. 700m south of Middle Point; sand with boulders at lower elevations; inside a kelp bed; shallow slope.
25.	(Maude Beach)	Beach est. 1.5 km southeast of entrance to Saltwater Lagoon; gravel at higher elevations, mud,

Table 2 (cont'd)

		eelgrass at lower elevation, kelp bed; shallow slope.
26.	(Menzies II)	Northeast corner of Menzies Bay, cobble beach, shallow slope with log booms adjacent.
27.	(Nymphe Cove)	Small cove in west side of southern entrance to Seymour Narrows; gravel with boulders at lower elevations; inside a kelp bed; steep slope; sand flat with eelgrass on west beach.
28.	(Brown Bay)	Small bay at northwest entrance to Seymour Narrows; approximately 500m south of Brown Bay; high density kelp bed; cobble with boulders at low elevations; moderate to steep slope.
29.	(Plumper Bay)	Beach immediately southeast of rocky cliffs on north side of Plumper Bay; gravel at higher elevation, mud, eelgrass at lower elevation, kelp bed; moderate slope.
30.	(Sea Lion Cove)	Beach in southwest corner of Deepwater Bay; gravel/sand beach; shallow slope; eelgrass at lower elevation.
31.	(Deepwater Bay)	Beach in southeast corner of Deepwater Bay; gravel/sand beach with small freshwater drainage; shallow slope.

Table 3. Table abbreviations and comments.

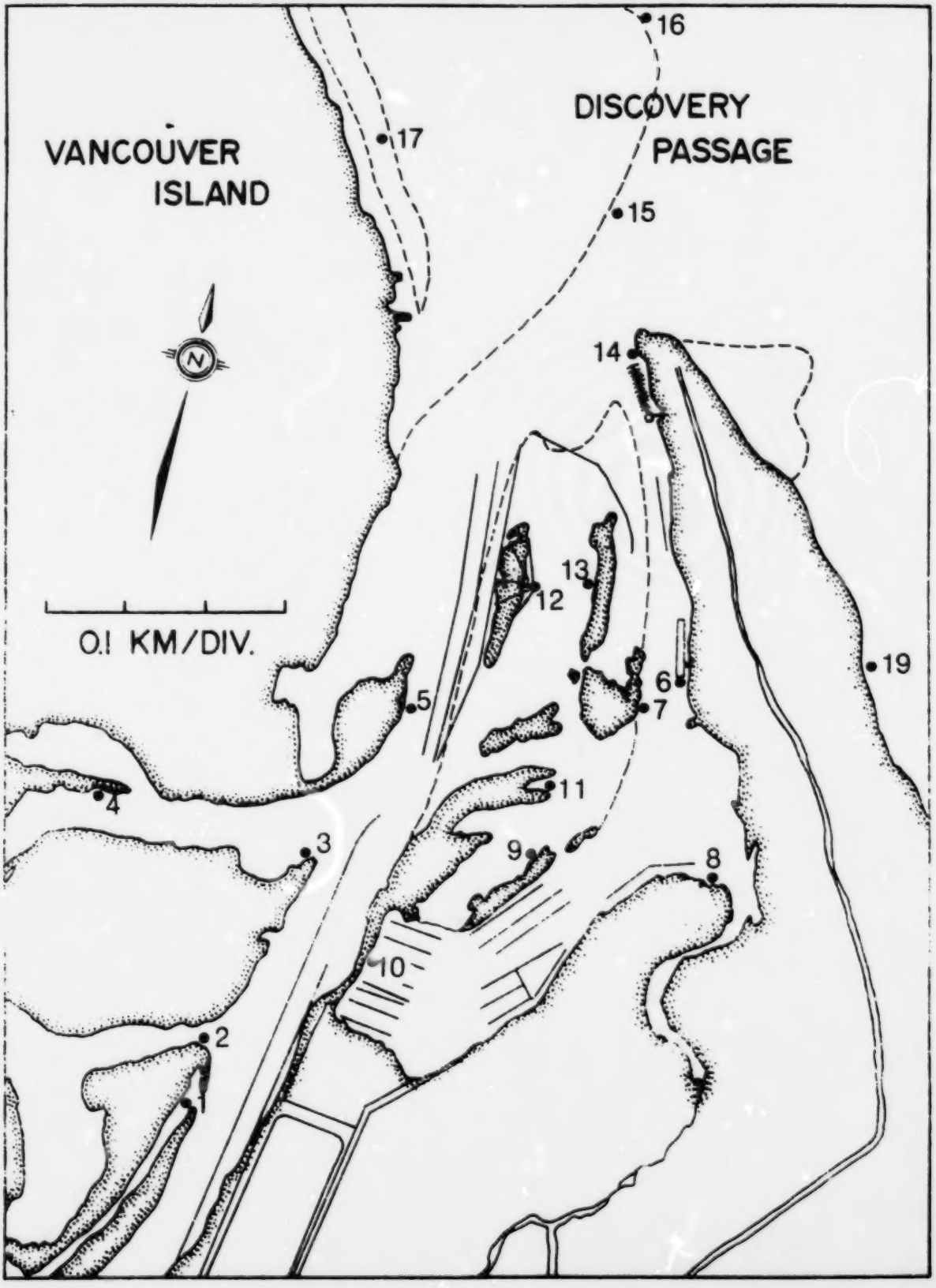
DESCRIPTION	COMMENTS
OBS	observations
TYPE	alpha-numeric to identify marked (M) or unmarked (U)
SPECIES	chum=1, unmarked chinook=2, marked chinook=3
STUDY	A-Anderson,D-dive(J.S. Macdonald),E-EVS,M-M.Kotyk,S-students
STN	revised station numbers 1-31
ZONE	inner est=1, isl=2, outer est=3, mar=4, outer mar=5, log sort=6
DATE	yymmdd
TCODE	time(season) early=1(mar-may31), mid=2(june), late=3(july-aug)
LEN	length (mm)
WGHT	weight (gm)
CONT	stomach content weight in GM'S, use '0' when empty
GAM	Gammaridea + Eogammarus species
EOGO	Eogammarus oclairi
EOGC	Eogammarus confervicolus
ALLA	Allorchestes angusta
CORSP	Corophium species
CALLSP	Calliopius species
PHOSP	Photis species
ATYC	Atylus collingi
PONSP	Pontogeneia species
HYP	Hyperiidea
PARSP	Parathemisto species
CAPR	Caprellidea
ISOPO	Isopoda
GNOO	Gnorimosphaeroma oregonense
IDOT	Idotea sp.
MYSI	Mysidacea
DECA	Decapoda
CRUME	Crustacea megalops
CRUZO	Crustacea zoea
EUPH	Euphausiacea
CUMA	Cumacea
CUMSP	Cumella species
LAMSP	Lamprops species
TANA	Tanaidacea
CAL	Calanoida
NEOPL	Neocalanus plumchrus
CALSP	Calanus species
PSESP	Pseudocalanus species
DIGM	Digested matter 1=present, =absent
HYASP	Hyale species
HARP	Harpacticoida
CIRR	Cirripedia

CALI	Caligoida
CYCL	Cyclopoida
OST	Ostracoda
CLAD	Cladocera
BOSSP	Bosmina species
DAPSP	Daphnia species
EVASP	Evadne species
PODSP	Podon species
INSAD	Insecta adult
INSNY	Insecta nymph
INSLA	Insecta larvae
COLL	Collembola
PLEC	Plecoptera
PSOC	Psocoptera
THYS	Thysanoptera
HEMI	Hemiptera
SALD	Saldidea
HOMO	Homoptera
PSYL	Psyllidae
CLISP	Climacia species
COLAD	Coleoptera adult
COLLA	Coleoptera larvae
TRICH	Trichoptera
LEPI	Lepidoptera larvae
DIPAD	Diptera adult
DIPPU	Diptera pupa
DIPLA	Diptera larvae
SIMU	Simuliidae
CHIAD	Chironomidae adult
CHIPU	Chironomidae pupa
CHILA	Chironomidae larvae
DALAD	Dalichopodidae adult
CERA	Ceratopogonigidae
HYME	Hymenoptera
PISCES	Fish
FISHEG	Fish eggs
NEMA	Nematoda
BIVAL	Bivalvia
MACBA	Macoma balthica
GAST	Gastropoda
ANNE	Annelida
ECTO	Ectoprocta
PLAM	plant material 1=present, =absent
WOOD	wood-rocks
ARAC	Arachnia
HYDRO	Hydrozoa
CEPH	Cephalopoda-Mollusca
MONS	Monstrilloida
CRUS	Crustacia

METPA	Metridia pacifica
COPE	Copepoda
EPHEM	Ephemeroptere
CRULA	Crustacea larvae
CHEAT	Chaetognatha
OPHI	Ophiuroidea
TAMP	GAM+EOGO+EOGC+ALLA+CORSP+CALLSP+PHOSP+ATYC+PONSP+HYP+PARSP+CAPR+HYASP
TISO	ISOPO+GNOO+IDOT
TINSC	INSAD+INSNY+INSLA+COLL+PLEC+PSOC+THYS+HEMI+SALD+HOMO+PSYL+CLISP+COLAD+COLLA+TRICH+LEPI+DIPAD+DIPPU+DIPLA+SIMU+CHIAD+CHIPU+CHILA+DALAD+CERA+HYME+EPHEM
TCAL	CAL+NEOPL+CALSP+PSESP+CALI+CYCL+MONS+METPA
TCLAD	CLAD+BOSSP+DAPSP+EVASP+PODSP

FIGURES

Fig. 1. Estuarine and transition zone station locations.


VANCOUVER
ISLAND
DISCOVERY
PASSAGE
N
0.1 KM/DIV.
1
2
3
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11
12
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14
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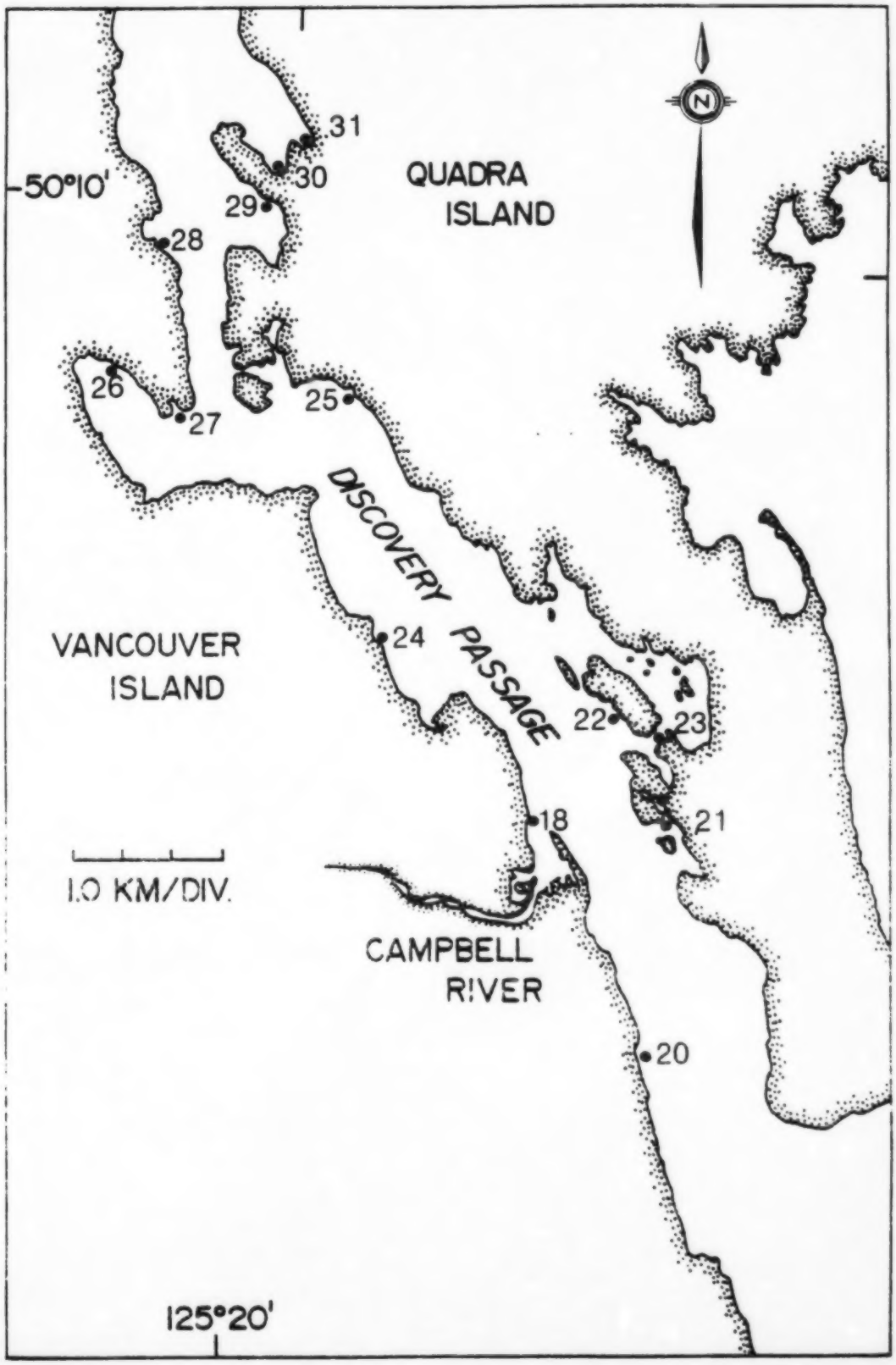
16
17
19

Fig. 2. Transition and Marine zone station locations.


N
50°10'
31
30
29
28
26
27
25
QUADRA
ISLAND
DISCOVERY PASSAGE
VANCOUVER
ISLAND
24
22
23
21
18
1.0 KM/DIV.
CAMPBELL
RIVER
20
125°20'